

APPLICATION FOR UNITED STATES LETTERS PATENT

INVENTOR: Choong-Jae LEE

TITLE: FOLDER TYPE MOBILE TERMINAL

ATTORNEYS: FLESHNER & KIM, LLP
P. O. Box 221200
Chantilly, VA 20153-1200

DOCKET NO.: P-0586

FOLDER TYPE MOBILE TERMINAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

[1] The invention relates to a mobile terminal, and more particularly, to a folder type mobile terminal.

2. Background of the Related Art

[2] Folder type mobile terminals have become very widely used due to a number of advantages associated with them. One such advantage is that a folder type mobile terminal can accommodate a large display, such as a liquid crystal display (LCD), making it easier to view information displayed to a user via the display. For example, newly developed dual LCD folder type mobile terminals which have an LCD mounted not only on an inner side of the folder, but also on an outer side thereof are becoming increasingly popular.

[3] The conventional art folder type mobile terminal such as that shown in Figure 1 has a body 8 in which a variety of electric equipment is mounted, a menu button 2 and a number of dial buttons 4 on a front surface thereof, and a battery 6 at a rear surface thereof. A folder portion 10 is rotatably connected to the body 8, and is provided with an LCD which is attached to both an inner side and an outer side thereof.

[4] Figure 2 is a disassembled perspective view of a mobile terminal in accordance with the conventional art, while Figure 3 is a sectional view of a folder engagement mechanism of a mobile terminal in accordance with the conventional art. The folder portion 10 of the conventional mobile terminal includes an upper cover 102 which forms an outer

surface of the terminal, and a lower cover 104 which engages with the upper cover 102 and which is rotatably connected to a body (not shown) of the mobile terminal. A printed circuit board 106 which has a sub LCD 108 mounted on a front surface thereof, a main LCD (not shown) mounted on a rear surface thereof, and a receiver 110 mounted at one side thereof, is mounted between the upper cover 102 and the lower cover 104.

[5] A transparent sub window 120 is provided in the upper cover 102 to allow a user to view information displayed on the sub LCD 108, and a transparent main window 112 is mounted in the lower cover 104 to allow a user to view information displayed on the main LCD. A mounting panel 114 for mounting the printed circuit board 106 is located at an inner side of the lower cover 104.

[6] The upper cover 102 and the lower cover 104 are typically attached with a bolt. A guide protrusion 128 is formed at an edge of a lower surface of the upper cover 102 and is inserted into a guide groove 122 formed at an edge of an upper surface of the lower cover 104 in order to align the upper cover 102 and the lower cover 104. An upper contact portion 124 is formed on a side surface of the guide protrusion 120, and a lower contact portion 126 is formed on a side surface of the guide groove 122 so as to make contact when the upper cover 102 and the lower cover 104 are assembled.

[7] Assembly of the foldable type mobile terminal according to the conventional art will now be described. First, the mounting panel 114 is mounted onto an inner surface of the lower cover 104. Next, the printed circuit board 106 with the LCD 108 mounted thereon is mounted on an inner side of the mounting panel 114. The upper cover 102 is then

connected to an upper surface of the lower cover 104, thereby completing the assembly of the conventional art foldable type mobile terminal.

[8] When assembled, the guide protrusion 128 is inserted into the guide groove 122 so as to properly align the upper cover 102 and the lower cover 104. If the guide protrusion 128 is properly fitted in the guide groove 122, and the upper cover 102 and the lower cover 104 are properly aligned, then the upper contact portion 124 and the lower contact portion 126 will make mutual contact, thereby supporting an engaged state of the upper cover 102 and the lower cover 104.

[9] However, if an external impact is applied to the upper cover 102 in the direction of arrow F in Figure 3, a concentrated load is applied to the upper contact portion 124 and the lower contact portion 126. Because the contact area which supports the engaged state of the upper cover 102 and the lower cover 104 is small, it is easily deformed by this type of external impact. In this case, the upper cover 102 can be deformed and come in physical contact with the LCD 108, thereby damaging the LCD 108.

SUMMARY OF THE INVENTION

[10] An object of the invention is to solve at least the above problems and/or disadvantages and to provide at least the advantages described hereinafter.

[11] To achieve these and other advantages, in whole or in part, and in accordance with the purpose of the invention, as embodied and broadly described herein, there is a folder type mobile terminal in accordance with an embodiment of the invention comprising a folder portion, comprising an upper cover and a lower cover, wherein the upper cover and

the lower cover are configured to be attached so as to form a space therebetween, a display mounted in the space formed between the upper and lower covers, and an impact dispersing mechanism formed at edges of the upper and lower covers and configured to disperse to the lower cover an impact applied to the upper cover.

[12] To further achieve these and other advantages, in whole or in part, and in accordance with the purpose of the invention, as embodied and broadly described herein, there is a folder type mobile terminal in accordance with an embodiment of the invention comprising a first cover configured to be attached to a second cover so as to form a space therebetween, a display installed in the space formed between the first and second covers, and an impact dispersing device formed on the first and second covers and configured to transfer to the second cover a force applied at the first cover.

[13] To further achieve these and other advantages, in whole or in part, and in accordance with the purpose of the invention, as embodied and broadly described herein, there is an impact dispersing device for a mobile terminal in accordance with an embodiment of the invention comprising a first rib formed at an edge of a first housing, a second rib formed at an edge of a second housing, wherein the second housing is configured to be attached to the first housing to form a space therebetween, a display mounted in the space formed between the first housing and the second housing, a first gap of substantially constant height formed between a surface of the first rib and a surface of the second rib, and a second gap of substantially constant height formed between an upper surface of the display and a lower surface of the first housing, wherein the height of the second gap is greater than the height of the first gap when the first housing is attached to the second housing.

[14] Additional advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[15] The invention will be described in detail with reference to the following drawings in which like reference numerals refer to like elements wherein:

[16] Figure 1 is a perspective view of a conventional art foldable type mobile terminal;

[17] Figure 2 is a disassembled perspective view of a conventional art mobile terminal;

[18] Figure 3 is a sectional view of a conventional art foldable type mobile terminal in a folded state;

[19] Figure 4 is a schematic disassembled perspective view of a mobile terminal according to an embodiment of the invention;

[20] Figure 5 is a schematic sectional view of a foldable type mobile terminal in a folded state according to an embodiment of the invention;

[21] Figure 6 is an enlarged view of 'A' of Figure 5; and

[22] Figure 7 is a schematic sectional view of a foldable type mobile terminal in a folded state to which an impact has been applied according to an embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[23] As shown in Figures 4 and 5, a folder portion of a mobile terminal according to an embodiment of the invention includes an upper cover 20 which forms an outer surface of the terminal, and a lower cover 22 which is attached to the upper cover 20 and which is configured to be rotatably coupled to a main body of the mobile terminal (not shown). A printed circuit board 24 which has a sub display 28, such as a sub LCD, at a front surface thereof, a main display (not shown), such as a LCD, at a rear surface thereof, and a receiver 30 configured to generate sound at one side thereof is mounted between the upper cover 20 and the lower cover 22. A mounting panel 26 is attached to an inner side of the lower cover 22 to accommodate the printed circuit board 24. A transparent sub window 32 through which a user can view information displayed on the sub display 28 is mounted in the upper cover 20. A transparent main window 34 through which a user can view information displayed on the main display is mounted in the lower cover 22.

[24] A guide protrusion 50 is formed at an edge of a lower surface of the upper cover 20, and a guide groove 52 is formed at an edge of an upper surface of the lower cover 22. The guide protrusion 50 and guide groove 52 serve to properly align the upper cover 20 and the lower cover 22 when they are assembled. The guide protrusion 50 extends in a longitudinal direction from both edges of the upper cover 20. Likewise, the guide groove 52

is formed with a constant depth and extends in a longitudinal direction from both edges of the lower cover 22. If the guide protrusion 50 is properly inserted into the guide groove 52 when the upper cover 20 and the lower cover 22 are assembled, a proper assembly position of the upper cover 20 and the lower cover 22 is achieved.

[25] A support area is formed at an edge of a lower surface of the upper cover 20 and at an edge of an upper surface of the lower cover 22. This support area comprises a first supporting portion 58 formed at an outer side of the guide protrusion 50, and a second supporting portion 60 formed at an outer side of the guide groove 52 and configured to contact the first supporting portion 58. If the upper cover 20 and the lower cover 22 are assembled, the first supporting portion 58 comes into contact with the second supporting portion 60, thereby maintaining the assembled state between the upper cover 20 and the lower cover 22.

[26] An impact dispersing mechanism prevents the display 28 from being damaged when a force F is applied to the upper cover 20. The impact dispersing mechanism disperses the force to the lower cover 22 and maintains an adequate clearance between the upper cover and the display. The impact dispersing mechanism is formed at an edge of a lower surface of the upper cover 20 and at an edge of an upper surface of the lower cover 22, and as shown in Figure 6, comprises a first rib 62 having a constant cross section which protrudes from an edge of a lower surface of the upper cover 20, and a second rib 64 having a constant cross section which protrudes from an edge of an upper surface of the lower cover 22 and faces the first rib 62. The first rib 62 is formed at an inner side of the guide protrusion 50 with a length shorter than that of the guide protrusion 50. The second rib 64 is

formed at an inner side of the guide groove 60 with a constant length and faces the first rib 62. Surfaces of the first rib 62 and the second rib 64 form a constant gap T when the upper cover 20 and the lower cover 22 are assembled, as shown in Figure 6. The gap T is preferably narrower than a gap Q between the upper cover 20 and the display 28, as shown in Figure 6.

[27] Assembly of the folder type mobile terminal according to embodiments of the invention will now be described. First, the mounting panel 26 is mounted on the lower cover 22, and the printed circuit board 24, to which the display 28 is attached, is mounted in the mounting panel 26. Next, the upper cover 20 is positioned above the printed circuit board 24, and the upper cover 20 and the lower cover 22 are secured to each other, thereby completing the assembly process. At this time, the guide protrusion 50 of the upper cover 20 is inserted into the guide groove 52 of the lower cover 22, thereby aligning an assembly position between the upper cover 20 and the lower cover 22.

[28] When assembled in this manner, if an impact is applied to the upper cover 20 as shown by arrow F in Figure 7, an intensive load is applied at areas of contact between the upper cover 20 and the lower cover 22. This causes the opposing surfaces of the first rib 62 and the second rib 64 to come into contact with each other, and thus the impact applied to the upper cover 20 is dispersed into the lower cover 22 through the first rib 62 and the second rib 64, thereby minimizing damage to the display 28. More particularly, if an impact such as force a F is applied to the upper cover 20, an intensive load is generated at the first rib 62, which is in contact with the second rib 64. Thus, the impact applied to the upper cover 20 is dispersed into the lower cover 22, thereby preventing damage to the display 28.

[29] Additionally, as stated earlier, the distance T between the first rib 62 and the second rib 64 is preferably less than the distance Q between the upper cover 20 and the display 28. Therefore, when a force F is applied to the upper cover 20 and the upper cover 20 is forced in a direction toward the lower cover 22, the positioning of the first rib 62 and the second rib 64 limits movement of the upper cover to a distance not greater than T . Thus, an adequate gap of not less than $Q-T$ is maintained between the upper cover 20 and the display 28, preventing damage to the display 28.

[30] The folder type mobile terminal according to embodiments of the invention is capable of preventing a display, such as a LCD, mounted in a folder from being damaged when an external impact is applied to an upper cover of the mobile terminal. That is, the impact is dispersed to a lower case by an impact dispersing mechanism installed between the upper cover and the lower cover.

[31] The foregoing embodiments and advantages are merely exemplary and are not to be construed as limiting the invention. The present teaching can be readily applied to other types of apparatuses. The description of the invention is intended to be illustrative, and not to limit the scope of the claims. Many alternatives, modifications, and variations will be apparent to those skilled in the art. In the claims, means-plus-function clauses are intended to cover the structures described herein as performing the recited function and not only structural equivalents but also equivalent structures.